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A Creative Approach to Devising Non-Technical, Meaningful Exercises in Human-Computer Interaction Undergraduate Education

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Abstract

Human-Computer Interaction is a diverse, interdisciplinary subject, drawing on knowledge and skills from fields like graphic design, psychology, cognitive science, and engineering. Yet, despite the breadth of Human-Computer Interaction, it is often condensed into one semester-long class as a requirement for students in the information and computing sciences. Furthermore, this one class may have to serve double-duty to satisfy the needs of both technical students (those with hands-on roles in creating user interfaces) such as those in Computer Science, and non-technical students (those who need to evaluate user interfaces as components of information systems) such as those in Information Systems. Research suggests educators approach the field through experiential learning, problem-based learning and teamwork although little research provides practical, hands-on exercises for undergraduate students to learn theories and concepts. In this paper, we present three examples of experiential activities that one instructor developed for a Human-Computer Interaction that included both technical and non-technical students. The course yielded largely positive outcomes, and provided us with insight for future opportunities to enhance the course. We are encouraged that our experience of creating hands-on, non-technical activities allow students will take away key lessons essential for their success in the future.

Keywords: Human-Computer Interaction education, Information Systems education, Computer Science education, experiential learning

1. INTRODUCTION

In the early days of computers, information technology (IT) workers used command-line interfaces to provide organizations with useful information. Few business employees themselves relied on computers. Today, nearly every worker uses multiple devices for their job. The advent of cloud computing, mobile applications, software-as-a-service built on personal computers, and point-and-click means that understanding the user is paramount to good design (Janicki, Cummings & Healy, 2015). Furthermore, individuals use technologies for a multitude of additional purposes like entertainment, social engagement, health monitoring, managing appliances in the home, etc.

These changes significantly impact companies and industries that were previously unaffected by

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IT. They must now be attentive to how customers (i.e., their user-base) interact with the technological facets of their products and services. To that end, their success is contingent on recruiting workers from the information and computing disciplines. Therefore, these students need an HCI education that prepares them to create and evaluate a wide range of human-computer interfaces. In other words, because computing technologies have become such a critical aspect of our daily lives, HCI is a key topic for majors in computer and information-related fields such as Information Systems (IS), Information Technology Management (ITM). Computer Science (CS), Software Engineering, and Information Science.

However, the impetus for a meaningful HCI education varies by discipline. For example, CS majors need to know how to engineer high-quality software that meets important functional requirements; and how to build this software so that it is usable, understandable, and limits user error. Meanwhile, ITM and IS students must know how to evaluate user interfaces (UIs) in order to work with developers in building efficient and effective systems, and how to select the best components of systems to automate workflows.

Although HCI is deep enough to stand alone as a major in its own right, other disciplines which benefit most directly from its theories and principles require few, if any, undergraduate HCI courses. For example, the 2010 IS Model Curriculum considers HCI an elective (Janicki et al., 2015), while the Curriculum Guidelines for Undergraduate Degree Programs in Computer Science recommends addressing HCI concepts in only 8 (2.9%) of the suggested minimum 280 core knowledge hours (Joint Task Force on Computing Curricula, Association for Computing Machinery [ACM] and IEEE Computer Society, 2013).

HCI is more interdisciplinary than CS and IS, drawing on knowledge and skills from fields as far-ranging as graphic design, psychology, cognitive science, and engineering. In curricula already over-brimming with material, it is difficult to condense appropriate coverage of HCI within curriculum recommendations. Furthermore, a single HCI course may need to serve double-duty to satisfy the needs of technical students (those with hands-on roles in creating user interfaces) and non-technical students (those who need to evaluate user interfaces as components of information systems) (Churchill, Bowser & Preece, 2013). How can instructors cope with these disparate needs; how can they teach one course that incorporates both art and science, and still serve diverse students' needs?
Janicki et al. (2015) call for infusing HCI concepts into existing courses in IS curricula in addition to creating standalone HCI electives. This paper describes three exercises that fulfill this call, and some ways to address diverse student needs in an undergraduate HCI course. HCI concepts were applied in the course design. Assignments were carefully built for technical and non-technical students without sacrificing rigor. This approach also helped students bridge the gap between information technology (IT) and non-IT people. The next sections briefly review the literature on HCI education, the HCI elective course itself, and the activities specifically designed for it. We conclude with key outcomes from the course, lessons learned and plans for how to revise the course in future iterations.

2. LITERATURE REVIEW

As a field, HCI has seen a shift from machine-focused design to user-centered design. As computing is constantly changing, HCI curricula must continually adapt to address who uses technology and why (Churchill, Bowser & Preece, 2016; Culén, 2015). Courses in HCI may take a particular perspective or emphasis based on not only the discipline it is taught in (IS, CS, IT, etc.) but also on how the instructor "perceives the role of such a course in the curriculum" (Or-Bach 2015, p. 153).

In both the most recent set of professional curriculum guidelines for undergraduates in CS (ACM and IEEE, 2013) and for those in IS (Topi, Valacich, Wright, Kaiser, Nunamaker Jr, Sipior, & De Vreede, 2010) mandatory HCI concepts and topics that are espoused include: context, user-centered development, evaluation measures and techniques, heuristics, usability testing, task analysis, prototyping, accessibility, fit, and standards. However, the CS guidelines provide suggestions for electives in HCI that include topics such as: interface animation, geometry management, software architecture patterns, UI programming environments, natural language processing, security measures and implications, and studies in emergent technologies.

Although topics and approaches may vary between disciplines and instructors, we nevertheless recognize that designing good UIs is as much science as it is art. Accordingly, all students studying HCI need to understand the theories behind basic HCI principles (Faiola,

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2007). This requires understanding what computers can do, how people behave, and what organizations need to accomplish.

Furthermore, HCI education should adopt more student-centered pedagogy, which leads to better learning outcomes; particularly in rapidly shifting problem domains. Educators in HCI recommend incorporating active, student-centered learning principles such as experiential learning (Obrenović, 2012), problem-based learning (Ioannou, Vasiliou, Zaphiris, Arh, Klobučar & Pipan 2015) and teamwork (Adamczyk & Twidale, 2007); although little research provides practical, hands-on exercises for undergraduate students to learn HCI theories and concepts.

A project to study the state of HCI education from 2011 to 2014 determined that the most important core concepts for an HCI curriculum are: interaction design, experience design, mobile displays, design methods, and research methods (Churchill, Bowser & Preece, 2016). Accordingly, HCI education must take into account "the required baseline knowledge and abstract skills to perform complex conceptual work" (Rosenberg, 2016, p. 75). This suggests varying approaches are beneficial to teaching HCI.

"Experiential learning is a guided process of questioning, investigating, reflecting, and conceptualizing based on direct experiences. In this learning process, the learner is actively engaged, has freedom to choose, and directly experiences the consequences of their actions" (Obrenović, 2012, p. 67). In this modality, it is vital to create guided exercises that are accessible, meaningful, and challenging to explore difficult concepts (Obrenović, 2012).

Problem-based learning challenges students to solve a real world problem, with or without guidance. It can improve student "satisfaction, critical thinking and reflection" (Vasiliou, Ioannou & Zaphiris, 2013). Another oft-used practice is the prototype walkthrough in which a student team presents a prototype to a test user to evaluate (Culén 2015; Hundhausen, Fairbrother & Petre, 2012). Although these methods are useful in helping students understand "what", they do not explain "why". They address the whole without illuminating fundamental building blocks of HCI design.

Another suggestion is to teach students about "the messy parcel of creative processes" involved in design thinking as opposed to focusing solely on theory and technical skills. "Creativity and adaptability may offer a greater permanent value to HCI students than many other kinds of knowledge and skills commonly considered to be part of the HCI education" (Culén 2015, p. 1-2). In order to accomplish these lofty goals, student exercises must be carefully crafted to balance "a procedure that all can follow on one hand" and "an understanding of users and their needs on the other hand" (Culén, 2015, p. 2). The exercises discussed in this article fulfilled these goals.

HCI education is complex to the point that one school turned to 3D virtual worlds to institute problem-based learning activities. Students virtually collaborated, designed and built prototypes (Zaharias, Belk & Samaras, 2012). Yet this exercise required at least some prior technical expertise on behalf of the students which means it could only be accessible (and henceforth, meaningful) to those who already had a prerequisite set of skills and knowledge. Students, especially in an undergraduate program, may enter into an HCI course without such a background. If an HCI course is intended to serve students from different majors, this could be especially problematic.

The exercises we discuss in this article are easier to implement without a technical background (such as understanding sophisticated virtual programs). They are intended to teach key HCI concepts in a meaningful way to students who may have different previous experiences and different motivations for taking such a course.

3. THE HCI ELECTIVE

Within these constraints, an HCI elective course was developed entitled "Introduction to Human-Computer Interaction" to serve the needs of students in a department of computer and information sciences. The instructor taught this course in Spring 2016 at a state university whose primary mission is undergraduate teaching. Of the 17 students enrolled in the course, five were IS majors, 9 were CS majors, and 3 were majors outside the department (communications, business, and psychology). The instructor has extensive HCI expertise and publications in the domain, and had previously taught graduate and undergraduate HCI courses online at prior institutions. The course description stated:

The course introduces techniques, ideas, and models involved in designing, implementing, and evaluating interactive technologies for human use. It explores principles of design and usability, with an emphasis on the human-side of *interaction. Accordingly, in addition to human and computing factors, the role of task (goals) and context are highlighted as key to understanding interaction phenomena at the individual, group, organizational, and societal levels. These include issues related to internationalization, such as cultural, ethical, and social aspects of interaction.*

This course was introduced in the department to capitalize on the instructor's expertise, and to broaden students' IS education. However, students' diverse backgrounds presented a unique challenge. Activities had to be accessible to non-technical students and valuable to technical students. The next section describes 3 activities implemented over the term.

4. COURSE DESIGN

Activity #1 (Design)
To engage in informed, scholarly conversations about HCI, students first needed a vocabulary rooted in the most basic concepts of design. Two of these, *affordances* and *constraints*, were a major focus of the first week. It began with a brief lecture defining affordance as "the design aspect of an object which suggests how the object should be used; a visual clue to its function and use" (Chamberlin, 2010, p.169; citing Norman [1988]). After reviewing examples from the field, students were sent on a scavenger hunt to reinforce the idea, breaking into teams of two or three. Based on the notion that affordances are a core design concept permeating all human artifacts; they explored the building in which their classroom was situated. Armed with their smart devices, they had to find at least three distinct artifacts in which affordances could be readily identified. They then emailed photos of these artifacts to the instructor. After 20 minutes, students came back to the classroom and explained which artifacts they photographed and how affordances served as visual cues to their intended uses.

The next class meeting focused on constraints, defined as the "limitations of the actions possible perceived from object's appearance" (Norman, 1988). As with the affordance hunt, students again photographed artifacts they identified with intentionally designed constraints. They then explained how these constraints provided cues to the objects' proper usage.

For both exercises, the instructor displayed students' photos on the screen as team members discussed affordances and constraints. He guided the conversation to highlight the implications of these concepts. A few examples from these exercises were as follows:

- Levers on the toaster oven in a student lounge (affordance)
- Flat bar on a door indicating it should be pushed open (affordance)
- Shape of opening on top of recycle bins (constraint)
- Napkin dispenser where only one hangs down at a time (constraint)

One of the best class discussions on the subject of affordances and constraints came as one group submitted the image in Figure 1. They reasoned it was a constraint as the middle spot of the bench was designed without cushions to signal it was not for sitting, but rather, to place items on.

Figure 1: Design with Constraints

While the class largely agreed this example was demonstrative of a constraint, the instructor noted that constraints can make the affordances of an artifact more visible. In this example, the middle section further provided a hint that the cushions were to be used differently (for sitting). In other words, affordances and constraints proffer different but entwined cues on how to use an artifact, much like two sides of the same coin.

However, not all examples were quite on target. In a few instances, students shared photographs of directions such as those above the fire extinguisher depicted in Figure 2, or a sticker on a soap dispenser stating that proper use is automated when one's hands are placed under it.

Such misunderstandings proved to be quite useful as teachable moments that reinforced the concepts at hand. That is, the class was able to better comprehend the concepts of affordances and constraints as properties of an object; while recognizing that directions (while they may be important and necessary at times) are not design characteristics.

Figure 2: Misunderstanding of Affordances

Activity #2 (Use)

Piggy-backing off Activity #1, students were given a homework the next week designed to make them think about how design of computing artifacts impacts use. Each student uploaded 3 screenshots or images of hardware, software, mobile apps, or websites that they believed excelled at HCI. Mindful that class had focused on affordances and constraints to this point, the rationale behind this exercise was to (1) connect these concepts to computing in general, and (2) establish a bridge to the next topic, "fit".

"Fit is based on the understanding of human physical constraints, limitations, and potentials" (Zhang, Carey, Te'eni & Tremaine, 2005). The class emphasized three categories: physical, cognitive and affective. Physical fit refers to matching input and output techniques in interactive technologies to the physiology of human beings with respect to minimal effort for task completion (Te'eni, 2006). The idea of cognitive fit is that task performance (or success) is dependent on how users' mental representations of technologies match their solving problems strategies (Vessey & Galletta, 1991). Affective fit considers the match between a user's desired emotional state and UI design (Zhang et al., 2005).

Students presented examples such as Snapchat, YikYak, XBox Kinect, Battle.net, and Duolingo. Almost universally, students considered these "intuitive." While they used terminology from Week 1 to describe their chosen technologies, the idea of being intuitive was pervasive in their presentations.

For example, one student live-demoed Snapchat. He argued that "it just made sense," because upon starting the app, he could swipe right to access individual conversations or swipe left to look at stories shared with groups. When pushed about why this was intuitive, he insisted those movements felt most natural for the actions they afforded. The student noted that icons on the bottom left and bottom right of the start screen reinforced this intuitiveness. From here, the instructor briefly introduced mental models, a key construct within cognitive fit that would later be expanded upon a few weeks later.

Another student presented photos of Xbox Kinect hardware including images of individuals using the motion-detectors to control software. She described her experiences with it, and again, emphasized that because it responded to natural gestures, it was an exemplar case of HCI. She also indicated that many of the games and apps on Kinect provided unique affordances to indicate specifically what actions the user could take through gestures and body movements.

Nobody in the class challenged this example, and it served as a further case for mental models. However, the instructor pointed out that Kinect exhibited a form of HCI that was less recognizable in Snapchat: physical fit. In particular, Kinect allowed for direct manipulation of a computing environment, another concept to be expanded upon later in the term.

A third example of note was Duolingo, an app for learning new languages. The student who chose this described the app and showed off screenshots, naming several icons as affordances that indicated categories users could test their knowledge in (such as word bubbles for phrases,

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a hamburger for food, and a stick-figure in motion for verbs). Perhaps more curiously, the student explained that the design of the software itself motivates users to continually engage in use. He pointed out that the app tracks user progress including consecutive days of use (called streaks), and rewards accomplishments with level ranks and tiers (see Figure 3), as well as in-app currency (called lingots) used to "buy" power-ups and special modes.

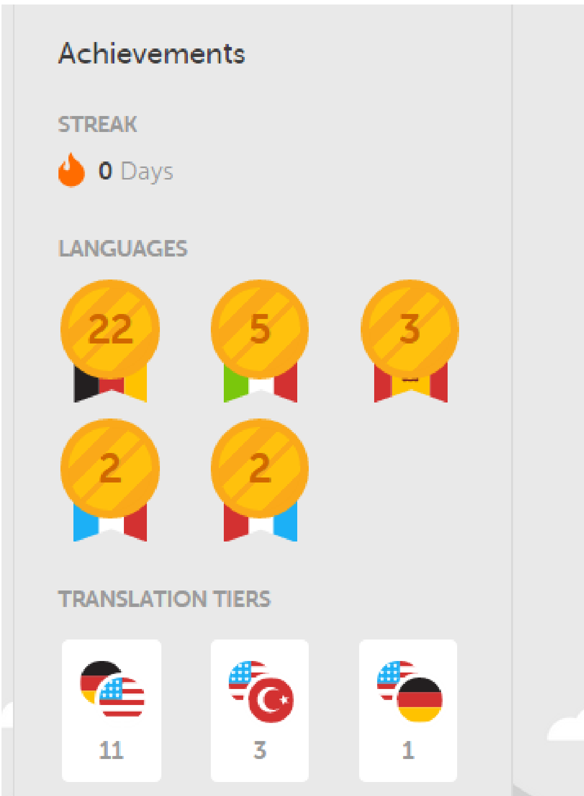

Figure 3: Duolingo Motivational Affordances (Duolingo, 2016)

This example was unique as it was the only one which touched on concepts related to affective fit. The instructor explained that this type of fit was as important as the other two, and that all-too-often, such is overlooked in UI design.

The key takeaway of the discussions that stemmed from this activity was that affordances and constraints comprise some of the most basic building blocks of HCI; yet alone are not sufficient to understand, evaluate, and build computing artifacts that exhibit meaningful ways of interaction.

Activity #3 (Prototype with Documentation)
By the end of the semester, the class had covered an expansive array of pertinent HCI concepts, with an emphasis on usability, fit, and design principles/guidelines. A final, summative project required students to apply these concepts to UI design. While some pupils expressed an interest in using digital tools to create prototypes, those without technical backgrounds expressed severe hesitation.
In response to these diverse needs, students were required to propose a new UI for an interactive website, software package, or mobile application designed to help users accomplish some specific set of tasks or goals (as opposed to open-ended or purely recreational use). They were required to integrate concepts from the course through two distinct and equally important components: a rough prototype and accompanying documentation. The rough prototype consisted of a non-functional mock-up of one or more UIs to reflect the main functions of the website, app, or software. At a minimum, it had to represent at least three key pages, screens, or menus.

For this act of prototyping, students could use any tool from pen and paper to Photoshop, and PowerPoint to wire-framing tools. The instructor insisted that one's ability to draw or use the digital tools were not the focus of the assignment. Rather, assessment was based on showing understanding of constructs learned over the term. Their instructions stated that:

> *The key to designing a good prototype is to mindfully and conscientiously apply concepts that we learned over the course of the semester. This includes physical, cognitive, and affective fit; usability; and design principles/guidelines.*

Evidence of the variety of prototypes designed by students can be seen in Figures 4 and 5 in which the former is an example of one that was hand-drawn, while the latter illustrates the use of a wire-framing tool.

In the documentation for the project, students described the chosen product and the tasks and goals it was designed to fulfill. They identified intended users and contexts of use. Then, they summarized how the prototype represented the product's main functions, while incorporating practical concepts from class. In respect to fit, students detailed how they were mindful of principles from physical engineering and cognitive psychology and the user's emotional state. Regarding usability, students explained why the prototype (or product in general) was useful and

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addressed how they accounted for Nielsen's 5 quality components of usability (Nielsen, 2003).

Finally, students addressed finer points of design learned during the later portion of the semester. In detailing how they accounted for UI design principles, they needed to explain (1) how their prototype made use of affordances and constraints to guide user actions; and (2) how their prototype had either been designed for error, or had been designed to promote trust. For UI design guidelines, there were three requirements: students had to (1) explain how their prototype made use of metaphors; (2) how their prototype either provided a sense of meaningful user feedback or direct manipulation; and (3) what sort of aesthetic considerations were taken into account that were not otherwise discussed in this document.

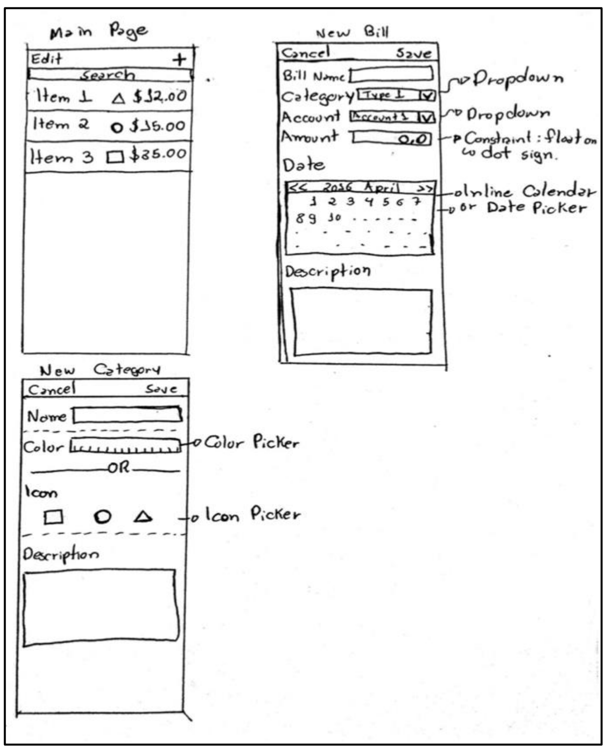

Figure 4: Hand-Drawn Prototype Example

The prototype portion of the assignment allowed those who were more technically-oriented to get hands-on experience with utilizing computing tools to construct a UI prototype. In fact, a few students took it upon themselves to go above and beyond in submitting an actual, usable prototype. Those who were less technically-oriented took the pen-and-paper route. Still, regardless of which set of skills students chose to apply in building their prototype, the accompanying documentation made everyone articulate why they did what they did, and how concepts from HCI were intentionally applied.

5. OUTCOMES

The average course grades demonstrated that students were actively involved in the course and moderately successful at activities and assignments. Of the 17 students, 9 received a grade over 90%, 3 earned a grade within the 80% range, and 5 were below 80% but still earned a passing grade. As this was a first-attempt at implementing this sort of course design, no comparisons were made in respect to the technical and non-technical student learning outcomes.

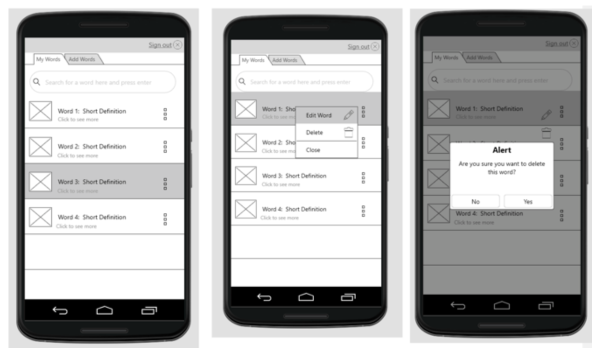

Figure 5: Prototype from Wire-Framing Tool

Overall, student feedback was positive, as evidenced by the average score received on the end-of-term course evaluation. A total of 12 students (70.6% response rate) completed the voluntary survey online. The overall ranking of the course from students was 5 out of 6 points. Of note, this same rank (5 out of 6) was received on the items "the tasks performed in this course supported my intellectual growth" and "I found this course to be intellectually challenging and stimulating". However, the item "in terms of my own learning, this course achieved its stated objectives," was ranked lowest at 4.58 out of 6.

Open-ended comments about the course on this evaluation focused largely on the instructor himself. However, one student wrote, "good class, important tools for UX design and UX experience. It'd be nice to see more modern examples in class. Maybe design a user-interface as a class together? It would be cool, and offer people a chance to have a 'project' to show to future employers." Obviously, this student gained an appreciation of HCI's importance to his or her future career after taking this course.

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In the future, we plan to design rubrics and evaluations to gain more insight on activity outcomes and what could be improved in respect to course content, in-class exercises, assignments, and other assessments.

6. CONCLUSIONS

Humans interact with computing devices above and beyond the business needs that computers were originally intended for. It is not uncommon for mobile devices to be the primary vehicle for delivering entertainment or navigating a big city. Amazon.com, the world's leading electronic retailer, reported over $107 billion in net sales in 2015 (Amazon, n.d.). We use social media for curating relationships with 1.13 billion daily active users (Facebook Newsroom, n.d.), even as a strategic medium for major presidential candidates. The recent interest in an "internet of things" includes embedding human-computer interaction elements into everything from toasters to lights, from children's toys to make-up containers, even "smart" vodka bottles (Morgan, 2016). In fact, the number of devices in this internet-of-things is expected to reach 21 billion in about 4 years (Gartner Inc., 2015).

As noted above in discussing Activity #2, the instructor found that students initially considered a good UI to be one that was "intuitive". However, when pushed to expand upon what this meant, students could not think past the basics like "easy to use," or "simple"; or they only ascribed concepts from the first week of class. And herein lies a significant lesson the authors learned from this course: *we need approaches to teach our students HCI which demystify misleading concepts such as "intuitive".*

In a world where we are preparing our students to make major decisions (professionally and personally) related to technology development and/or implementation, that which makes device or software use feel "intuitive" is not a trivial concern. Rather, it is the gold-standard for the field and henceforth, the trajectory for our pupils. Designing a UI to appear intuitive derives from both scientific theory and artistic principles; that when done well, virtually becomes unnoticeable. That is, to the untrained eye and unprepared mind, it may well seem like magic.

Therefore, HCI educators are obliged to endow our students with the knowledge and skillset to understand *why* a good UI feels almost invisible to the user, or *why* a bad one can cause harm (physically or emotionally). Through carefully crafted lessons, we can teach our students the essence of these theories and principles as to allow them dissect what feels invisible, magical, and intuitive; and to leverage this toward their success as future computing and information professionals.

The course exercises described in this article were designed to do just this in such a way that suits a variety of backgrounds and career directions. This course represents a first attempt to create an interesting, interactive course for technical and non-technical students in HCI. All assignments and content, therefore, had to be accessible by all students (which meant nothing could *require* technical expertise or outcomes, although those who could were welcome to integrate their skills where they were able).

The course was modestly successful, highlighting some important lessons for the future in respect to teaching students a broad array of critical HCI concepts in a widely-accessible fashion. We believe these lessons should be of particular interest for those in a multidisciplinary field such as IS.

Our first lesson is that of the benefit of non-technical activities which encourage students to think outside of the boxes of their "home" discipline. While it is important to tailor any class to its intended audience as much as possible, computing expands into most corners of our lives. This means that the concepts students need to know about HCI can (and should) be demonstrated in realms beyond those situated only within the field of computing. Activities such as identifying affordances and constraints "in the wild" or having to explain why an artifact "feels intuitive" helps to expand how students think about interaction. Furthermore, the prior experiences and interests of the students may be very different, as might their intended career paths upon graduation. Therefore, we suspect that designing more activities such as these, even in a classroom with a homogeneous demographic, can have a beneficial impact.

We also learned that students tend to find HCI more engaging when they can apply it to areas that match their specific individual interests. For example, CS students may need activities which allow them to showcase technical skills, versus IS and ITM students (or even business students) who may need to apply concepts to a given problem domain. In the future, we will incorporate more activities that allow students to explore HCI in various domains as we did with

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Activity #3, such as designing, improving, or evaluating a user interface for something they'd want to use, or solves a problem they identify, or critiques an interface they like or dislike). Additionally, we plan ensure that some activities are team-based as so students can gain insight from those who have perspectives, backgrounds, and interests different from their own.
Another opportunity we identified is that in the future, we plan to ask students to identify more examples of HCI done poorly that they run across. During the term, several students commented that they wanted to see more current illustrations of poor design rather than old examples (such as Windows 98 and outdated websites). In teaching best practices in HCI, the tendency is to identify technologies that excel, or that do a decent enough job at satisfying current user goals and needs. This practice may illustrate why theories or guidelines help to demystify that sense of "intuitiveness," but we argue that examples of poor usability or fit do an even better job of it.

However, as we create better interfaces over time and implement more useable and useful designs, the best place to look for poor design is backward. This means that, typically, the best examples will be "old" or "outdated" in the minds of our students. Therefore, in the next iteration of this course, students will be required to find negative examples of concepts discussed in class. These could likely help pupils recognize that poor design sticks out like an ugly sore thumb, and henceforth that which is intuitive is accomplished only through intentional and mindful application of theory and principles. Furthermore, requiring students to identify poor UI examples would allow an instructor to create a bank of cases to use in the future that (hopefully) are more current.

We expect that future sections of this class will improve our non-technical approach to HCI instruction. A significant limitation of this paper is that we are reporting on a course has only been through one iteration. In the future, we expect to have more details to report on in respect to items such as: guidelines for activity design including ideas on how to determine which approaches to adopt; learning outcome metrics for technical and non-technical students; and team-based exercises that leverage the diverse experiences.

This course was challenging to build, even for an experienced HCI researcher and teacher, due to students' diverse needs. We suspect that this challenge alone may reduce the likelihood that HCI will be incorporated into future IS curricula. We hope that our examples and experiences provide a guide for future instructors. Primarily, we hope this work serves as a starting guide to encouraging the implementation of hands-on, non-technical activities which illustrate the most important, core concepts of HCI in such a way that benefits the most students. In the activities for the course described above, students learned key lessons that will be fundamentally essential for their future careers as computing and information professionals.

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